

CISC 3115 MY3

Programming Environment and Essential Tools

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Outline

- Get around in Operating Systems
 - Unix-like: Unix, Linux, OS X and Windows
 - Terminal and command line
- Development environment
 - Set up program authoring tools
 - Editors
 - Set up JRE and JDK

Programming ...

“Computer science is no more about computers than astronomy is about telescopes”

-- Edsger Dijkstra

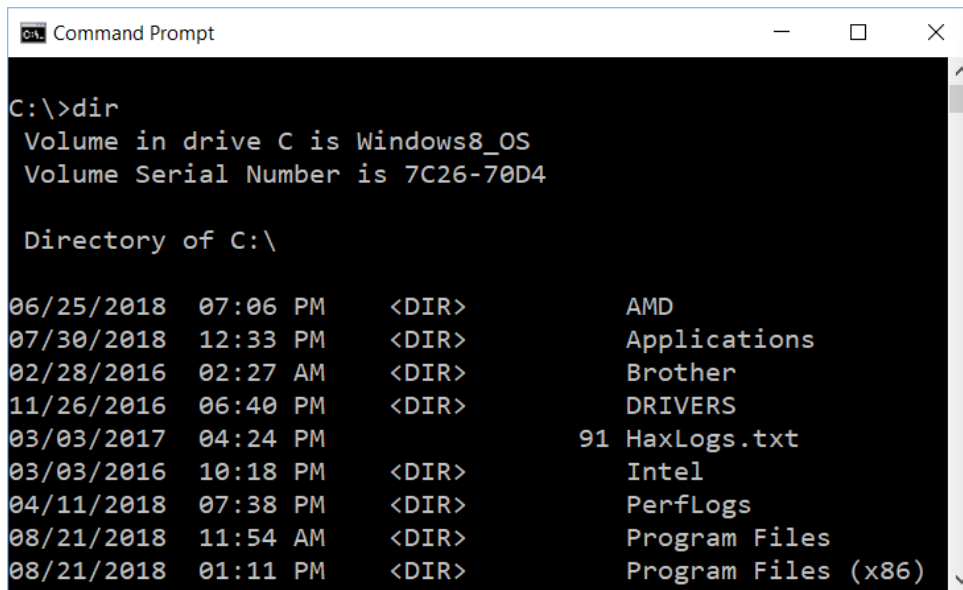
- Our objective as a computer scientist:
 - To solve computational problems
 - By developing computer programs
 - On computer systems
- We shall have a brief discussion about Operating Systems and programming environment

Operating Systems

- Do you know the answers to the questions:
 - Where are my files?
 - What is a folder or a directory?
 - How do I install an computer application?
 - How do I open a terminal window?
 - How do I copy/delete/rename a file, or a folder/directory. How about several files or folders/directories?
- To learn programming, it is necessary to be proficient in using your computer. Minimally, you need to know the answers to the questions like these.
 - If not yet, no sweat, we will get there this semester.

Terminal and Command Line

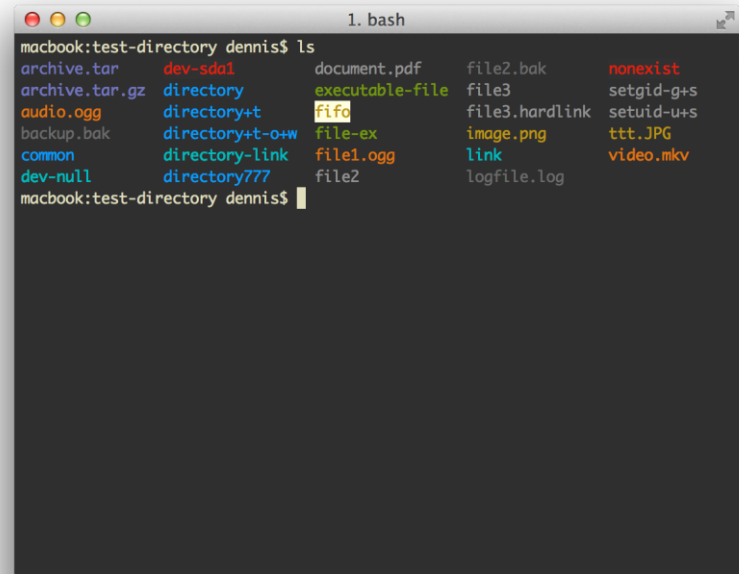
- Use a Command Line
- Why?



```
C:\>dir
Volume in drive C is Windows8_OS
Volume Serial Number is 7C26-70D4

Directory of C:\

06/25/2018  07:06 PM    <DIR>          AMD
07/30/2018  12:33 PM    <DIR>          Applications
02/28/2016  02:27 AM    <DIR>          Brother
11/26/2016  06:40 PM    <DIR>          DRIVERS
03/03/2017  04:24 PM                91 HaxLogs.txt
03/03/2016  10:18 PM    <DIR>          Intel
04/11/2018  07:38 PM    <DIR>          PerfLogs
08/21/2018  11:54 AM    <DIR>          Program Files
08/21/2018  01:11 PM    <DIR>          Program Files (x86)
```



```
macbook:test-directory dennis$ ls
archive.tar      dev-sda1      document.pdf   file2.bak      nonexistent
archive.tar.gz  directory     executable-file file3           setgid-g+s
audio.ogg        directory+t   fifo          file3.hardlink setuid-u+s
backup.bak       directory+t+o+w file-ex       image.png     ttt.JPG
common           directory-link file1.ogg     link          video.mkv
dev-null         directory777  file2        logfile.log
```

Common Tasks on Command Line

Windows

- Display working directory: `cd`
- Display content of a directory: `dir`
- Change directory: `cd directory_to_go`
- Make directory: `mkdir dir_to_make`
- Move files: `move this_file to_dir`
- Delete file: `del file_to_delete`
- Delete directory: `rmdir dir_to_delete`

Unix-like

- Display working directory: `pwd`
- Display content of a directory: `ls`
- Change directory: `cd directory_to_go`
- Make directory: `mkdir dir_to_make`
- Move files: `move this_file to_dir`
- Delete file: `rm file_to_delete`
- Delete directory: `rmdir dir_to_delete`

Questions?

- Can you get around on Windows/Unix-like systems using command line?

JRE and JDK

- JRE: Java Runtime Environment
 - Required to run a Java program
- JDK: Java Development Kit
 - Required to compile and run a Java program
- Have you had JDK installed/set up in your system?

Oracle JDK vs Open JDK

- Java
 - A specification. There are more than one implementations and packaging.
 - <https://docs.oracle.com/javase/specs/index.html>
- Oracle JDK
 - <https://www.oracle.com/java/technologies/javase-downloads.html>
- Open JDK
 - <https://openjdk.java.net/>
- But, wait!!!

Java Version

- For this class, Java 11 LTS or 17 LTS or 21 LTS is required.
 - <https://www.oracle.com/java/technologies/javase/jdk11-archive-downloads.html>
 - <https://www.oracle.com/java/technologies/javase/jdk17-archive-downloads.html>
 - <https://www.oracle.com/java/technologies/javase/jdk21-archive-downloads.html>

Verify JRE is Present

- On Command Line
 - `java -version`

```
Command Prompt
C:\>java -version
java version "1.8.0_261"
Java(TM) SE Runtime Environment (build 1.8.0_261-b12)
Java HotSpot(TM) 64-Bit Server VM (build 25.261-b12, mixed mode)
C:\>
```



```
Command Prompt
C:\>jave -version
'jave' is not recognized as an internal or external command,
operable program or batch file.
C:\>
```



Verify JDK is Present

- On Command Line (screen shots are dated)
- javac -version

```
Command Prompt
C:\>javac -version
javac 1.8.0_251
C:\>_
```



```
Command Prompt
C:\>javac -version
'javac' is not recognized as an internal or external command,
operable program or batch file.
C:\>_
```



Verify Versions of JVM and Java Compiler

- On command line (screen shots are dated)

```
Command Prompt
C:\Users\hui>java -version
java version "1.8.0_301"
Java(TM) SE Runtime Environment (build 1.8.0_301-b09)
Java HotSpot(TM) 64-Bit Server VM (build 25.301-b09, mixed mode)

C:\Users\hui>javac -version
javac 14.0.2

C:\Users\hui>
```



```
Command Prompt
C:\Applications\Java>java -version
openjdk version "16.0.2" 2021-07-20
OpenJDK Runtime Environment (build 16.0.2+7-67)
OpenJDK 64-Bit Server VM (build 16.0.2+7-67, mixed mode, sharing)

C:\Applications\Java>javac -version
javac 16.0.2

C:\Applications\Java>
```



Trouble with JDK?

- “I have installed JDK, but still I got this!”

```
Command Prompt
C:\>javac -version
'javac' is not recognized as an internal or external command,
operable program or batch file.
C:\>_
```



- You need to set up the search path for JDK's executables (such as, javac)
 - System specific, but we will do it via the user profile of “Git Bash”

In-Class Exercise

- Let's complete the following tasks
 - Open a terminal
 - Show working directory
 - Display content in the working directory
 - Switch to a different directory
 - Create a directory
 - Delete the directory
 - Verify if JRE is present
 - Verify if JDK is present (if inaccessible on command line, it is OK for this exercise; we shall address this in a little while)
 - Write a short manual about the steps in the journal in directory C0826

In-Class Exercise

1. Create a folder (i.e., directory) , such as “CISC3115” somewhere on your computer
2. In the “CISC3115” directory, create a subfolder (i.e., subdirectory), e.g., for today, create the “C0829” folder.
3. Go to the directory (“cd C0829”)
4. Create a batch file (on Windows systems)/shell script (on UNIX systems)
 - Windows

```
echo java -version > checkjava.cmd
echo javac -version > checkjavac.cmd
```
 - UNIX

```
echo “java -version” > checkjava.sh
echo “javac -version” > checkjavac.sh
```


Questions?

- Can you either
 - Set up a required version of JDK, or
 - Verify it has been already set up?

Coding Environment for the Class

- Instructor's preferred development environment during lecture demos
 - Git Bash + Atom editor + JDK
- Online IDE
 - Examples: replit.com; Github codespaces
- (Optional, not recommended) Using Desktop IDEs
 - IntelliJ IDEA
 - Eclipse
 - NetBeans
 - BlueJ
 - Dr. Java
 - ...
- <https://www.sci.brooklyn.cuny.edu/~goetz/java/>

Prepare Coding Environment

1. Install the git client (if not already installed)

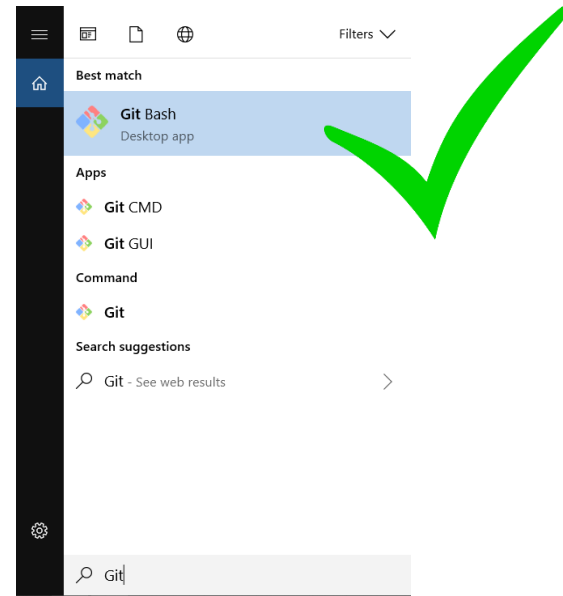
- Why do we need this?
 - For Windows users, use Unix-like terminal on Windows
 - Version your submitted work
 - Get feedback from autograder (provided by the instructor)

2. Install the Atom editor (if not already installed)

- Why do we need this?
 - This is the instructor's choice to author simple Java programs
 - It has syntax highlighting, but limited autocomplete and other features, which forces us to learn the language and the API.

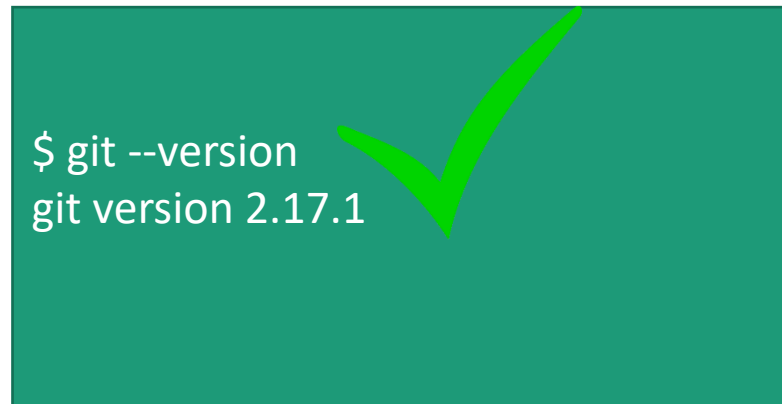
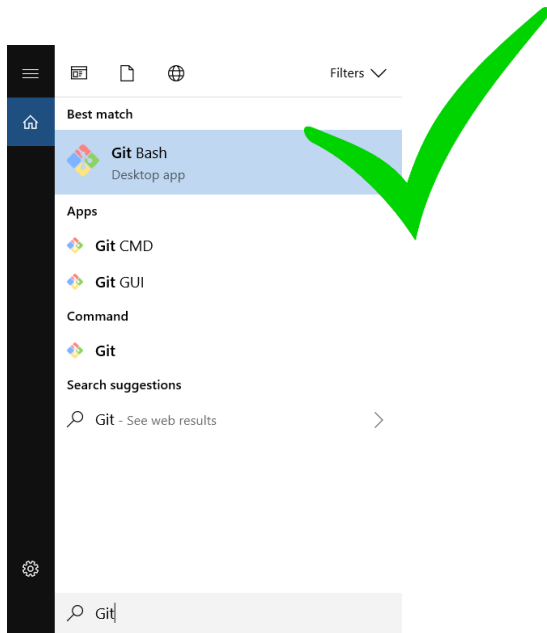
Verify Whether You Have Git Client

- Verify if you have had the Git client installed already
- Windows
 - Attempt to run “Git Bash”
- Unix (OS X or Linux):
 - Open a terminal window
 - Run “git --version”, i.e., type “git --version” (without quotes) and hit the Enter key



Have I Had Git Client Installed?

- Windows and Unix



- If not, download and install it

Download Git Client

- Visit <https://git-scm.com/downloads> using your favorite Web browser

The screenshot shows the 'Downloads' section of the Git website. It features three operating system options: Mac OS X, Windows, and Linux/Unix, each with a green checkmark. To the right is a monitor displaying the latest source release '2.18.0' and a 'Download 2.18.0 for Windows' button, also with a green checkmark. Below these are two sections: 'GUI Clients' and 'Logos', both crossed out with a red X. The 'GUI Clients' section mentions built-in tools like 'git-gui' and 'gitk', and provides a link to 'View GUI Clients'. The 'Logos' section mentions various Git logos in PNG and EPS formats and provides a link to 'View Logos'.

Downloads

Mac OS X Windows Linux/Unix

Latest source Release
2.18.0
Release Notes (2018-06-21)
Download 2.18.0 for Windows

Older releases are available and the Git source repository is on GitHub.

GUI Clients
Git comes with built-in GUI tools (**git-gui**, **gitk**), but there are several third-party tools for users looking for a platform-specific experience.
[View GUI Clients →](#)

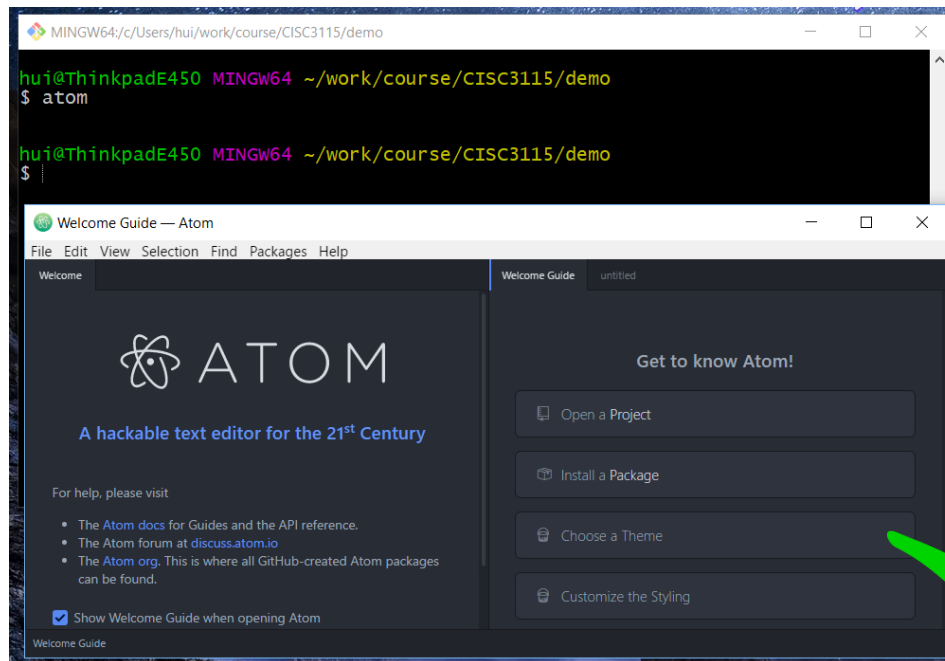
Logos
Various Git logos in PNG (bitmap) and EPS (vector) formats are available for use in online and print projects.
[View Logos →](#)

Git Bash on Windows

- Provides a terminal where you can run Unix commands
- The instructor shall use the Git Bash from now on so that the instructions are identical to both Windows and Unix (e.g., OS X) users
- Window users: Use the Git Bash terminal
- Unix users: just use a terminal (e.g., the terminal on OS X)





Verify Whether You Have Atom Installed

- Verify if you have had the Atom editor installed already
 - Type atom on the Command Line



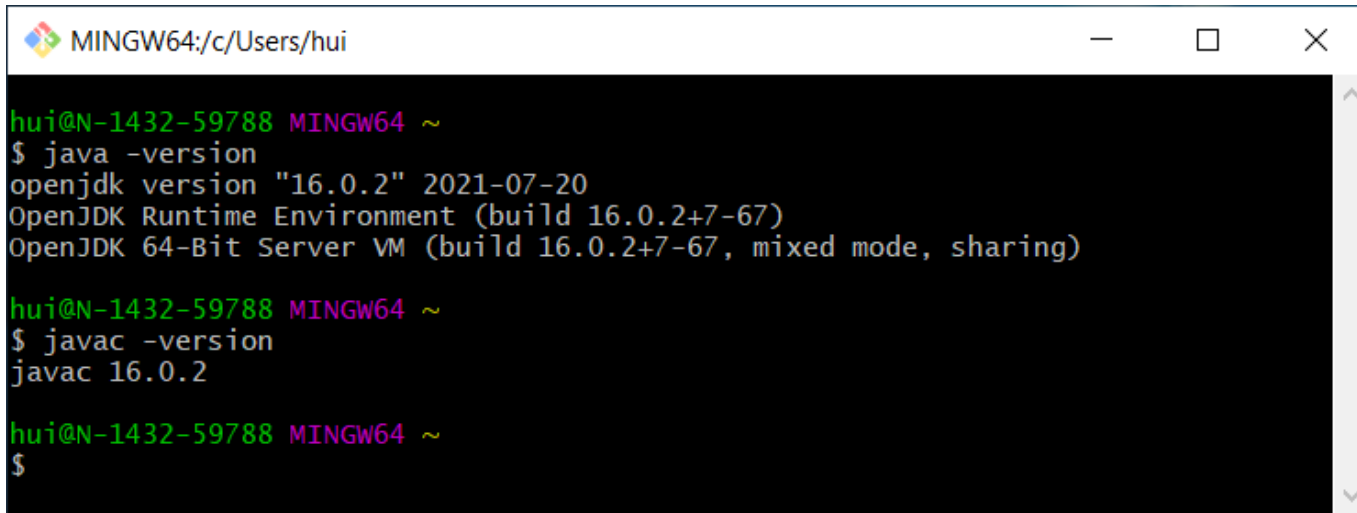
Download and Install the Atom Editor

- If you have not had the Atom Editor installed, download and install the Atom editor
- Visit
 - <https://github.com/atom/atom/releases/tag/v1.60.0>

 atom-x64-windows.zip	193 MB	Mar 7, 2022
 atom.x86_64.rpm	194 MB	Mar 7, 2022
 AtomSetup-x64.exe	190 MB	Mar 7, 2022
 AtomSetup.exe	184 MB	Mar 7, 2022

Checking on Java and Javac

- Check whether both java & javac are found, and have an identical version. Otherwise, next slide.

A screenshot of a terminal window titled 'MINGW64:/c/Users/hui'. The terminal shows three lines of output. The first line is the prompt 'hui@N-1432-59788 MINGW64 ~'. The second line is the command '\$ java -version' followed by the output 'openjdk version "16.0.2" 2021-07-20', 'OpenJDK Runtime Environment (build 16.0.2+7-67)', and 'OpenJDK 64-Bit Server VM (build 16.0.2+7-67, mixed mode, sharing)'. The third line is the prompt 'hui@N-1432-59788 MINGW64 ~'. The fourth line is the command '\$ javac -version' followed by the output 'javac 16.0.2'. The fifth line is the prompt 'hui@N-1432-59788 MINGW64 ~'. The sixth line is the command '\$' followed by a blank line.

```
hui@N-1432-59788 MINGW64 ~
$ java -version
openjdk version "16.0.2" 2021-07-20
OpenJDK Runtime Environment (build 16.0.2+7-67)
OpenJDK 64-Bit Server VM (build 16.0.2+7-67, mixed mode, sharing)

hui@N-1432-59788 MINGW64 ~
$ javac -version
javac 16.0.2

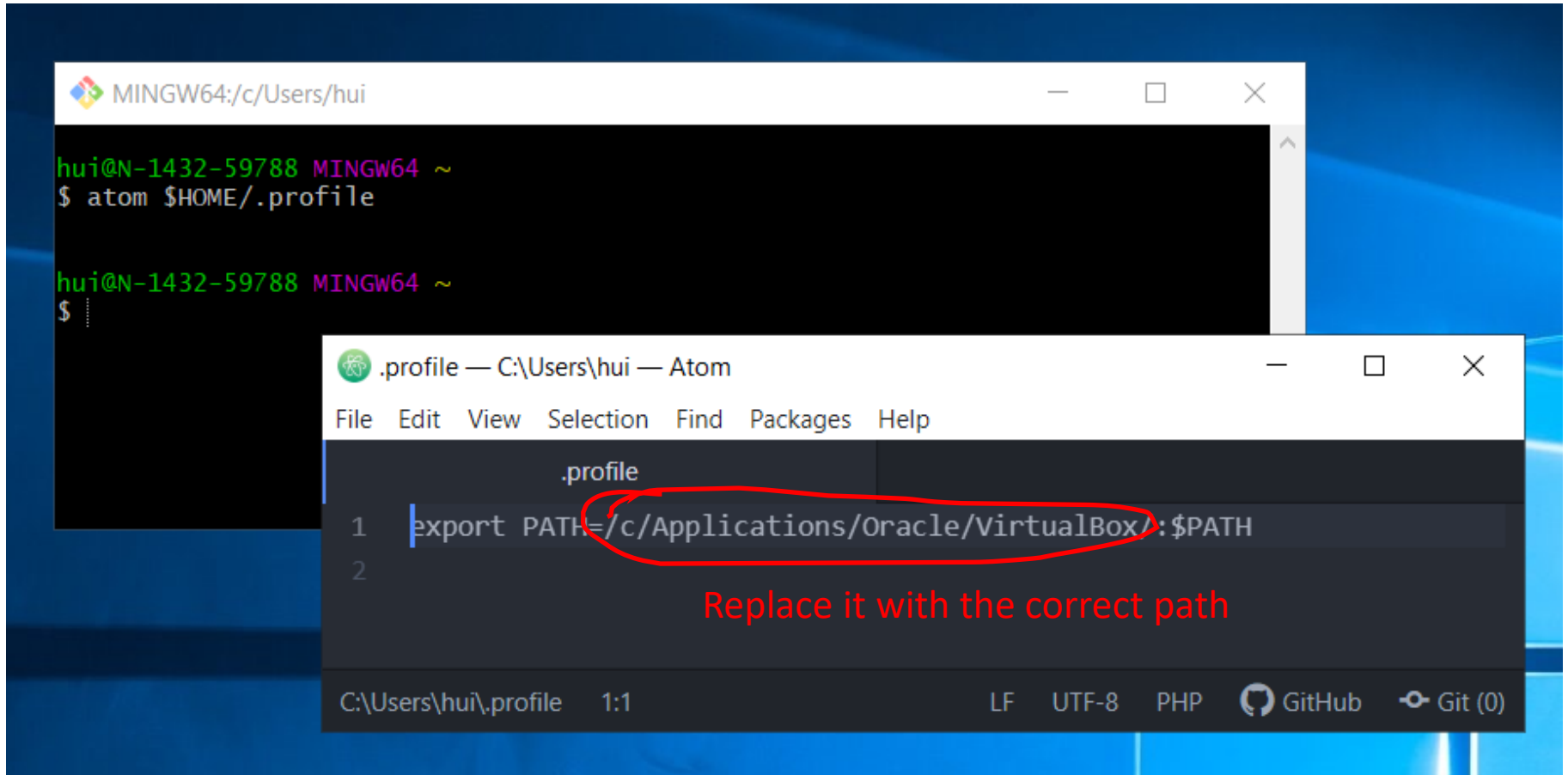
hui@N-1432-59788 MINGW64 ~
$
```

- Based on the screenshot, did I have the required version of JDK set up?

Setting up Search Path for java and javac

- Sometimes we also need to do this step:
 - In “Git Bash” terminal, create (if not already exists) or edit the .profile file on your “home directory” (see next slide)
 - Then, restart “Git Bash” terminal, and check accessibility and versions of Java and Javac

Edit/Create .profile File



The image shows a terminal window and an Atom editor window. The terminal window is titled "MINGW64:/c/Users/hui" and shows the command `atom $HOME/.profile` being executed. The Atom editor window is titled ".profile — C:\Users\hui — Atom" and shows the following content:

```
.profile
1 export PATH=/c/Applications/Oracle/VirtualBox/:$PATH
2
```

A red circle highlights the path `/c/Applications/Oracle/VirtualBox/` in the code. Below the code, the text "Replace it with the correct path" is written in red.

Questions?

- Can you set up git or verify the existence of git on your systems?
- Can you set up atom on your system?